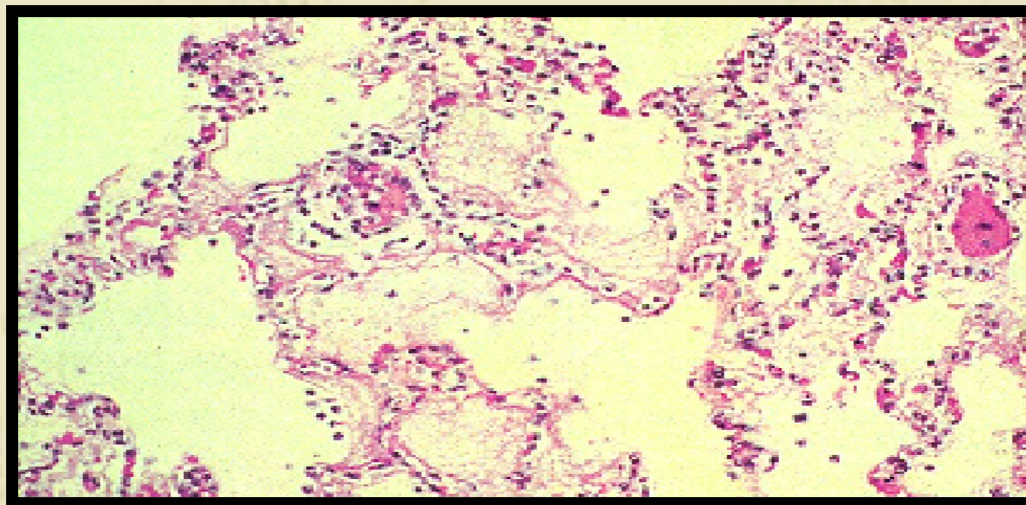




# ***Medical NBC Briefing Series***

## **Medical NBC Aspects of Staphylococcal Enterotoxin B (SEB)**





# Purpose

- ***This presentation is part of a series developed by the Medical NBC Staff at The U.S. Army Office of The Surgeon General.***
- ***The information presented addresses medical issues, both operational and clinical, of various NBC agents.***
- ***These presentations were developed for the medical NBC officer to use in briefing either medical or maneuver commanders.***
- ***Information in the presentations includes physical data of the agent, signs and symptoms, means of dispersion, treatment for the agent, medical resources required, issues about investigational new drugs or vaccines, and epidemiology.***
- ***Notes page***



Office of the Surgeon General  
for the Army

ence.



# Outline

- **Background**
- **Battlefield Response**
- **Medical Response**
- **Command and Control**
- **Summary**
- **References**





# Background

- **General Background**
- **SEB Disease Course Summary**
- **Disease Background**
- **Signs and Symptoms**
- **Diagnosis**
- **Treatment**
- **Current Situation**
- **Weaponization**





# General Background

- **Second most common form of food poisoning after Salmonella**
- **Generally not life threatening when ingested**
- **Inadequate food preparation and poor hygiene contribute to outbreaks**





# General Background (cont.)

- 1960's – U.S. studied SEB as a biological incapacitant
- Low quantities of inhaled agent can incapacitate
  - ED50 of 0.0004  $\mu\text{g/kg}$
  - LD50 of 0.02  $\mu\text{g/kg}$
- Could incapacitate 80% of personnel in the area of attack



# SEB Disease Course Summary

Day 1 <b>EXPOSURE</b> Incubation on 1-6 Hours	Day 2 (Aerosol)	Day 3 Ambulatory or littered based on severity of symptoms High fever, chills, headache, muscle aches, dry cough, eyelid inflammation	Day 4	Day 5	Day 6	Day 7
		If swallowed: nausea, vomiting, diarrhea SHOCK and DEATH			RARE CASES	
Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
			Patients Ambulatory Persistent Cough			
Day 15	Day 16	Day 17	Day 18	Day 19	Day 20	Day 21
			Patients Ambulatory Persistent Cough			
Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28
			Patients Ambulatory Persistent Cough			



# **Disease Background**

- **Heat stable**
- **Water soluble**
- **Relatively stable in air**
- **Causes symptoms at a very low dosage**
- **May be used to sabotage food or small volume water supplies**



# Signs and Symptoms

- Initial signs 1 to 6 hours post inhalation
- Abrupt onset of fever, chills, muscle aches, headache, and non-productive cough
- Severe difficulty breathing and chest pain
- Nausea, vomiting, and diarrhea if toxin swallowed
- Fever may reach 103 to 106° F and last 2 to 5 days
- Cough persists 1 to 4 weeks
- RTD in about 2 weeks



# Diagnosis Clinical

- Large numbers of respiratory patients in a 24 hour period
- Food poisoning cases would not present with pulmonary symptoms





# Diagnosis Laboratory

- Lab tests are not very helpful
- Serum detection is possible and should be drawn
- Urine samples – toxin accumulates in the urine for several hours post-exposure



# Treatment Prophylaxis

- **No human vaccine is available**
- **Animal studies are in development**





# Treatment (cont.)

- **Supportive care - special attention to increased respiratory symptoms**
  - Oxygen
  - Hydration
  - Ventilation support for severe cases
- **Medications**
  - Acetaminophen
  - Cough suppressant
- **RTD in 1-2 weeks**





# Current Situation

- High toxicity after aerosolization poses a significant threat to ground troops
  - Stable in the environment
  - Low quantities needed for effect
- Possibility of direct contamination of food supplies and non-chlorinated drinking water



# Weaponization

## Aerosolization

- Inhalation and contamination of food, water, and other surfaces
- Delivery systems can be simple
  - Agricultural sprayer
  - Gallon-sized garden sprayer
  - Fire extinguisher
  - Crop duster or boat
  - Bomblets
  - Aircraft
- Resistant to degradation by ultraviolet light



# Battlefield Response to SEB

- **Detect**
- **Protect**
  - Individual protection
  - Collective protection





# Detection

- **Possible methods of detection**
  - Detection of agent in the environment
  - Clinical (differential diagnosis)
  - Medical surveillance (coordination enhances detection capability)
- **PVNTMED personnel test water and food sources**
- **Diagnosis of SEB is not presumptive of a BW attack - SEB may be a result of poor food handling**



# Detection of Agent in the Environment

- Biological Smart Tickets
- Enzyme Linked Immunosorbant Assay (ELISA) (Fielded with the 520th TAML)
- Polymerase Chain Reaction (PCR) (Fielded with the 520th TAML)





# Detection of Agent in the Environment (cont.)

- M31E1 Biological Integrated Detection System (BIDS)
- Interim Biological Agent Detector (IBAD)





# Clinical Detection

## Sudden presentation of

- Respiratory syndromes presenting in groups
- Rapid progression of symptoms





# **Clinical Detection Laboratory Confirmation**

- **Division medical assets lack lab equipment to conduct test to determine SEB**
- **Specimen must be sent to theater level or CONUS lab**
  - Unit SOP's for collection
- **Lab specimens should be submitted to the correct diagnostic laboratory**
  - Responsibility of the Lab Officer
  - Ensure the chain of command is aware of the situation



# Clinical Detection Laboratory

## Confirmation (cont.)

Points of contact for biological sampling  
and shipping

- Corps Chemical Officer
- Technical Escort Unit
- AFMIC
- 520th TAML
- USAMRIID
- WRAIR
- CDC





# Detection Medical Surveillance



MARYLAND ARMY NATIONAL GUARD  
DISCOM 29<sup>th</sup> Infantry Division (Light)  
DIVISION MEDICAL OPERATION CENTER (DMOC)



## Patient Summary Report 29<sup>th</sup> INF (L) DIV

From: Division Medical Operations Center (DMOC)  
To: Division Surgeon

Date Time Group: From: 121200RJUN99  
To: 202400RJUN99

### PATIENTS

Nation	WIA	NBI	Disease	Neuropsychiatric Stress-Related	Total
US	0	97	55	0	152
Allied	0	0	0	0	0
EPW	0	0	0	0	0

### DISPOSITION

Return to duty	148
Holding in Division's MTFs	0
Evacuated and returned	3
Evacuated by air	0
Evacuated by ground	1
Expired en route	0
Expired in MTF	0

Clues in the daily  
medical disposition  
reports

- Unexpected high numbers of fevers, malaise, acute respiratory syndromes, coughing, chest pain



# Protect Individual Protection

- Mask only is sufficient for respiratory protection against SEB.
- Standard uniform clothing affords a reasonable protection against dermal exposure to biological agents
- Casualties unable to wear MOPP should be handled in casualty wraps





# Protect Collective Protection

- Hardened or unhardened shelter equipped with an air filtration unit providing overpressure
- Standard universal precautions should be employed as individuals are brought inside the collective protection units
- SEB is not communicable from person to person
- Water must be thoroughly disinfected
- All food must be thoroughly heated to kill any organisms



# Medical Response to SEB

- Triage and Evacuation
- Infection Control
- Resource Requirements





# Triage and Evacuation

- **Triage**
  - Priorities based on severity of symptoms
  - Respiratory support needs will increase priorities
- **Evacuation - Delayed or Immediate (depending on severity of symptoms)**
  - Required of all severely symptomatic patients in Echelons I & II; Echelons III & IV based on priority
  - Standard evacuation assets may be used



# Infection Control

- **SEB is not communicable from person to person**
- **Universal precautions apply for patient handling**
- **Food, water, and article decontamination (PVNTMED)**
- **Patient remains - Quartermaster section**
  - Decontamination, embalming, transportation in hermetically sealed



# Resource Requirements

- Evacuation Assets
- Supportive therapies
  - Pain relievers
  - Cough suppressants
- Intensive care facilities for severely respiratory-compromised patients





# Command and Control

- **Intelligence**

- Medical surveillance and intelligence reports are key to keep the Command alert to the situation

- **Maneuver**

- Quarantine is unnecessary

- **Logistics**

- Additional Class VIII materials will be required and evacuation routes to Echelon III will be heavily utilized

- **Manpower**

- Many soldiers may be affected by aerosol dissemination in a short period of time



# **Command and Control Response to Psychological Impact**

- **May vary from person to person**
- **Psychological Operations**
  - Rumors, panic, misinformation
  - Soldiers may isolate themselves in fear of disease spread
- **Countermeasures**
  - LEADERSHIP is responsible for countering psychological impacts through education and training of the soldiers
  - Implementation of defensive measures such as crisis stress management teams



# Summary

- **SEB is highly infectious when aerosolized**
- **SEB has been weponized**
- **Detection may not occur until after exposure when patients are reported**
- **Command decisions that will be required upon detection of SEB:**
  - Evacuation: Many patients will be presenting at one time. Methods of evacuation?
  - Treatment: Procuring additional pain relievers and cough suppressants to treat exposed individuals.



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